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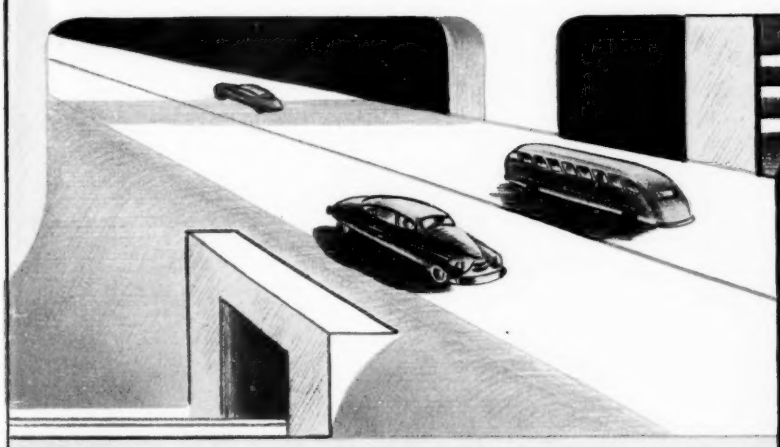

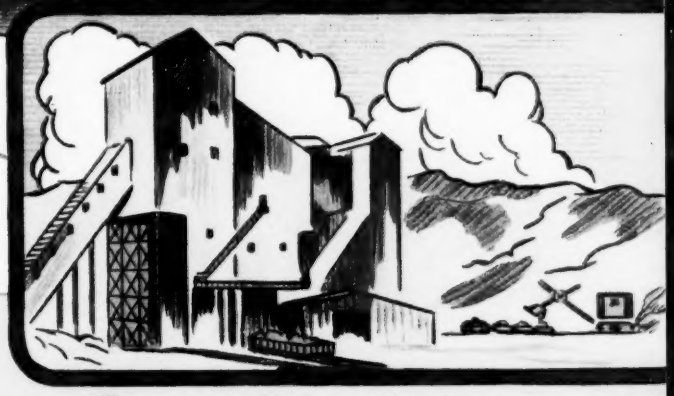

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- State-Federal Relations in Highway Development
- Dealings Between Businessmen
- Apportionment Under New Federal Aid Act Made to States for Fiscal Year 1950

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J. R. BOYD, Editor

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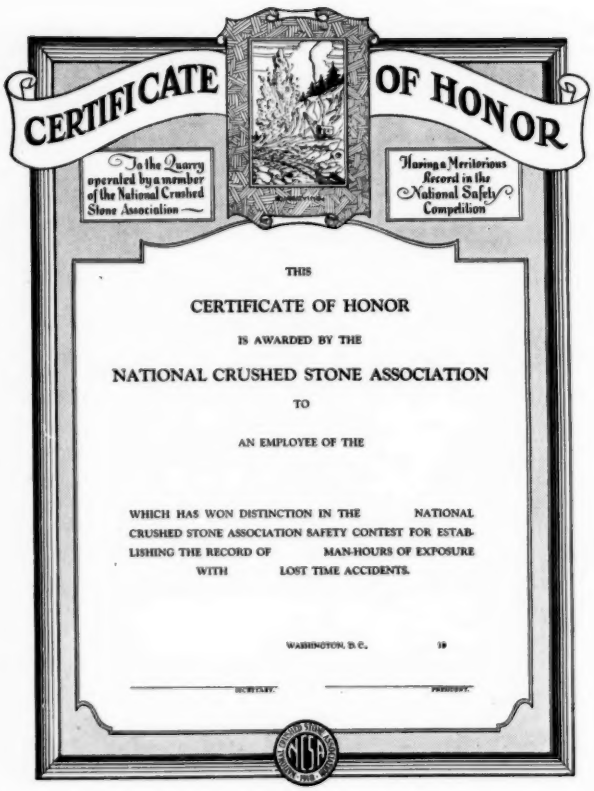
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THE
CRUSHED STONE JOURNAL

WASHINGTON, D. C.

Vol. XXIII No. 3 PUBLISHED QUARTERLY SEPTEMBER, 1948

The National Crushed Stone Association Safety Competition of 1947

By E. K. ELSNER
A. N. GUINAN

Under Supervision of Forrest T. Moyer
Chief, Accident Analysis Branch
Economics and Statistics Division
U. S. Bureau of Mines
Washington, D. C.

THE Rock Hill quarry of the General Crushed Stone Company at Quakertown, Pennsylvania, had the best safety record of the operations enrolled in the 1947 National Crushed Stone Association Safety Competition according to the Bureau of Mines, United States Department of the Interior. This trap-rock quarry won the bronze plaque provided by the Explosives Engineer magazine for the outstanding achievement of a period of operation of 93,869 man-hours without any disabling injuries through 1947. The 1947 trophy award was the first for the Rock Hill operation which has been enrolled each year since the competition was started in 1926. However, this quarry has had injury-free records in 5 other of the past 22 years and was awarded Certificates of Honorable Mention for these accomplishments in 1929, 1930, 1931, 1939, and 1943. The record of the quarry shows clearly what can be achieved in safety by the constant efforts of all employees and officials in a well-designed program to eliminate accidents.

It is notable that the first three ranking crushed stone operations in the 1947 Competition were the Rock Hill, Winchester, and Auburn quarries of the General Crushed Stone Company. These quarries were operated a total of 244,905 man-hours without any disabling injuries.

Statistics of the Competition

The over-all injury experience at the 50 crushed stone operations in the 1947 Competition was not favorable. The injury-severity rate of 8.902 days lost per 1,000 man-hours of work was the highest of any of the annual competitions since their start in 1926. (See Table V) The high severity rate resulted primarily from the 10 fatalities in 1947; a greater number than in any other year of the contests except 1927 when there also were 10 fatal injuries. There were 6 permanent partial and 226 temporary total injuries or a total of 242 injuries at the enrolled plants, a larger number than in any year since 1930. The 1947 injuries had a total time loss or charge of 73,553 days, an economic loss equivalent to 1,000 men working 73½ shifts.

Injury frequency of the competing plants in 1947 was 29.287 per million man-hours. This rate was more favorable than the average of 31.542 for the 22-year history of the Competition. However, it was a higher frequency of injuries than in 1946 and 1945.

Of the 50 operations enrolled in 1947, 42 were open quarries and 8 were underground mines. In the 42 quarries there were a total of 207 injuries of which 5 were fatal, 5 permanent partial and 197 temporary total injuries. (See Table III) The injury-severity

TABLE I

RELATIVE STANDING OF QUARRIES IN THE 1947 NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION, BASED UPON THE ACCIDENT SEVERITY RATES OF THE QUARRIES [1]

Rank	Man-hours worked	Number of injuries [2]					Average days of disability per temp. injury	Number of days of disability [2]					Frequency rate [3]	Severity rate [3]
		F.	P.T.	P.P.	Temp.	Total		F.	P.T.	P.P.	Temp.	Total		
1	93,869	—	—	—	—	—	—	—	—	—	—	—	0.000	0.000
2	86,460	—	—	—	—	—	—	—	—	—	—	—	.000	.000
3	64,576	—	—	—	—	—	—	—	—	—	—	—	.000	.000
4	63,622	—	—	—	—	—	—	—	—	—	—	—	.000	.000
5	55,515	—	—	—	—	—	—	—	—	—	—	—	.000	.000
6	179,685	—	—	—	2	2	10	—	—	—	20	20	11.131	.111
7	157,094	—	—	—	2	2	11	—	—	—	22	22	12.731	.140
8	92,968	—	—	—	2	2	8	—	—	—	15	15	21.513	.161
9	670,808	—	—	—	5	5	29	—	—	—	146	146	7.454	.218
10	91,611	—	—	—	5	5	4	—	—	—	20	20	54.579	.218
11	102,678	—	—	—	3	3	10	—	—	—	30	30	29.218	.292
12	130,645	—	—	—	3	3	14	—	—	—	42	42	22.963	.321
13	329,080	—	—	—	6	6	18	—	—	—	110	110	18.233	.334
14	55,627	—	—	—	1	1	23	—	—	—	23	23	17.977	.413
15	90,250	—	—	—	3	3	14	—	—	—	41	41	33.241	.454
16	588,166	—	—	—	19	19	16	—	—	—	299	299	32.304	.508
17	187,139	—	—	—	5	5	20	—	—	—	102	102	26.718	.545
18	185,609	—	—	—	4	4	34	—	—	—	135	135	21.551	.727
19	49,642	—	—	—	2	2	19	—	—	—	37	37	40.288	.745
20	218,877	—	—	—	7	7	24	—	—	—	165	165	31.981	.754
22	113,704	—	—	—	5	5	18	—	—	—	92	92	43.974	.809
23	30,816	—	—	—	2	2	13	—	—	—	26	26	64.901	.844
24	227,801	—	—	—	14	14	16	—	—	—	223	223	61.457	.979
25	53,196	—	—	—	1	1	56	—	—	—	56	56	18.798	1.053
27	54,792	—	—	—	2	2	38	—	—	—	76	76	36.502	1.387
28	105,586	—	—	—	8	8	19	—	—	—	154	154	75.768	1.459
29	181,962	—	—	—	9	9	30	—	—	—	267	267	49.461	1.467
30	228,827	—	—	1	13	14	15	—	—	150	191	341	61.182	1.490
32	301,851	—	—	1	17	18	18	—	—	300	313	613	59.632	2.031
34	276,597	—	—	—	17	17	45	—	—	—	770	770	61.461	2.784
35	53,520	—	—	—	4	4	38	—	—	—	151	151	74.738	2.821
36	34,182	—	—	—	1	1	103	—	—	—	103	103	29.255	3.013
37	114,625	—	—	1	4	5	34	—	—	225	135	360	43.621	3.141
38	25,476	—	—	—	3	3	28	—	—	—	85	85	117.758	3.336
39	206,441	—	—	—	8	8	90	—	—	—	723	723	38.752	3.502
40	293,037	—	—	1	9	10	25	—	—	2,400	229	2,629	34.125	8.972
41	401,493	1	—	—	—	1	—	6,000	—	—	—	6,000	2.491	14.944
42	323,264	1	—	—	3	4	14	6,000	—	—	42	6,042	12.374	18.691
45	132,577	—	—	1	5	6	8	—	—	3,825	40	3,865	45.257	29.153
47	123,539	1	—	—	1	2	7	6,000	—	—	7	6,007	16.189	48.624
48	120,170	1	—	—	2	3	50	6,000	—	—	100	6,100	24.965	50.761
49	74,413	1	—	—	—	1	—	6,000	—	—	—	6,000	13.439	80.631
Totals and rates, 1947	6,971,790	5	—	5	197	207	25	30,000	—	6,900	4,990	41,890	29.691	6.008
Totals and rates, 1946	7,292,175	1	—	6	197	204	21	6,000	—	5,141	4,130	15,271	27.975	2.094

[1] As reports from mining companies are considered confidential by the Bureau of Mines, the identities of the plants to which this table relates are not revealed.

[2] F., fatal; P.T., permanent total disability; P.P., permanent partial disability; Temp., temporary disability.

[3] Frequency rate indicates the number of fatal, permanent, and other disabling injuries per million man-hours of exposure; severity rate indicates number of days of disability lost from injuries per thousand man-hours of exposure.

TABLE II

RELATIVE STANDING OF UNDERGROUND MINES IN THE 1947 NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION, BASED UPON THE ACCIDENT-SEVERITY RATES OF THE MINES [1]

Rank of plant	Man-hours worked	Number of injuries [1]					Average days of disability per temp. injury	Number of days of disability [1]					Frequency rate [1]	Severity rate [1]
		F.	P.T.	P.P.	Temp.	Total		F.	P.T.	P.P.	Temp.	Total		
21	82,501	—	—	—	2	2	32	—	—	—	64	64	24.242	0.776
26	38,799	—	—	—	1	1	46	—	—	—	46	46	25.774	1.186
31	144,090	—	—	—	3	3	72	—	—	—	216	216	20.820	1.499
33	31,701	—	—	1	—	1	—	—	—	75	—	75	31.545	2.366
43	371,604	1	—	—	18	19	57	6,000	—	—	1,029	7,029	51.130	18.915
44	307,008	1	—	—	2	3	41	6,000	—	—	81	6,081	9.772	19.807
46	292,248	2	—	—	2	4	68	12,000	—	—	135	12,135	13.687	41.523
50	23,211	1	—	—	1	2	17	6,000	—	—	17	6,017	86.166	259.231
Totals and rates, 1947	1,291,162	5	—	1	29	35	55	30,000	—	75	1,588	31,663	27.107	24.523
Totals and rates, 1946	1,338,563	2	—	2	31	35	34	12,000	—	675	1,045	13,720	26.147	10.250

[1] See footnotes 1, 2, and 3, Table I.

TABLE III

YEARLY SUMMARY—QUARRIES IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION, 1926–47 [1]

Year	Plants	Man-hours worked	Number of injuries [1]					Number of days of disability [1]					Frequency rate [1]	Severity rate [1]
			Fatal	P.T.	P.P.	Temp.	Total	Fatal	P.T.	P.P.	Temp.	Total		
1926	40	5,298,983	3	—	6	207	216	18,000	—	9,000	4,239	31,239	40.763	5.895
1927	48	7,876,791	9	—	2	458	469	54,000	—	2,100	7,186	63,286	59.542	8.034
1928	53	7,509,098	8	—	4	322	334	48,000	—	8,700	5,493	62,193	44.479	8.282
1929	53	7,970,325	4	—	5	286	295	24,000	—	5,760	5,533	35,293	37.012	4.428
1930	68	8,013,415	6	—	9	227	242	36,000	—	7,250	3,671	46,921	30.199	5.855
1931	58	5,085,857	4	—	13	198	215	24,000	—	18,660	3,540	46,200	42.274	9.084
1932	40	2,661,850	1	—	4	75	80	6,000	—	6,750	2,481	15,231	30.054	5.722
1933	40	2,704,871	1	—	1	67	69	6,000	—	48	2,893	8,941	25.510	3.306
1934	46	3,288,257	1	—	2	106	109	6,000	—	2,850	1,873	10,723	33.148	3.261
1935	46	4,166,306	2	1	8	77	88	12,000	6,000	9,900	3,015	30,915	21.122	7.420
1936	50	6,399,023	5	—	14	182	201	30,000	—	8,168	4,590	42,758	31.411	6.682
1937	47	6,199,001	7	—	9	136	152	42,000	—	5,875	4,461	52,336	24.520	8.443
1938	47	4,658,119	2	—	6	76	84	12,000	—	6,600	3,184	21,784	18.033	4.677
1939	44	4,219,086	2	—	2	51	55	12,000	—	4,800	1,678	18,478	13.036	4.380
1940	46	4,358,409	1	—	5	78	84	6,000	—	2,550	3,013	11,563	19.273	2.653
1941	47	5,777,587	3	—	5	98	106	18,000	—	9,300	2,266	29,566	18.347	5.117
1942	48	7,178,935	3	2	1	183	189	18,000	12,000	1,500	4,239	35,739	26.327	4.978
1943	34	4,750,314	4	—	5	134	143	24,000	—	7,146	3,862	35,008	30.103	7.370
1944	32	3,996,433	3	—	4	118	125	18,000	—	3,000	3,323	24,323	31.278	6.086
1945	46	6,087,037	—	—	1	135	136	—	—	750	3,505	4,255	22.343	0.699
1946	46	7,292,175	1	—	6	197	204	6,000	—	5,141	4,130	15,271	27.975	2.094
1947	42	6,971,790	5	—	5	197	207	30,000	—	6,900	4,990	41,890	29.691	6.008
Total	—	122,463,662	75	3	117	3,608	3,803	450,000	18,000	132,748	83,165	683,913	31.054	5.585

[1] See footnotes 1, 2, and 3, Table I.

TABLE IV
YEARLY SUMMARY—UNDERGROUND MINES IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION, 1926-47 [1]

Year	Plants	Man-hours worked	Number of injuries [1]					Number of days of disability [1]					Frequency rate [1]	Severity rate [1]
			Fatal	P.T.	P.P.	Temp.	Total	Fatal	P.T.	P.P.	Temp.	Total		
1926	3	517,926	—	—	—	34	34	—	—	—	533	533	65.646	1.029
1927	2	318,449	1	—	1	14	16	6,000	—	300	68	6,368	50.244	19.997
1928	5	542,193	1	—	1	68	70	6,000	—	300	888	7,188	129.105	13.257
1929	4	665,520	1	—	1	30	32	6,000	—	300	617	6,917	48.083	10.393
1930	6	595,367	1	—	1	15	17	6,000	—	225	468	6,693	28.554	11.242
1931	3	345,105	—	—	—	4	4	—	—	—	147	147	11.591	.426
1932	2	158,450	—	—	—	6	6	—	—	—	165	165	37.867	1.041
1933	3	229,381	—	—	—	11	11	—	—	—	349	349	47.955	1.521
1934	4	248,146	—	—	—	13	13	—	—	—	287	287	52.389	1.157
1935	2	175,994	—	—	—	3	3	—	—	—	249	249	17.046	1.415
1936	4	334,747	1	—	—	7	8	6,000	—	—	117	6,117	23.899	18.274
1937	3	364,680	—	—	—	3	3	—	—	—	91	91	8.226	.250
1938	3	334,442	—	—	—	2	2	—	—	—	133	133	5.980	.398
1939	4	393,039	—	—	1	7	8	—	—	600	457	1,057	20.354	2.689
1940	4	375,987	—	—	1	8	9	—	—	4,500	888	5,388	23.737	14.330
1941	4	591,568	—	—	1	15	16	—	—	750	169	919	27.047	1.553
1942	4	785,894	—	—	1	33	34	—	—	1,800	1,213	3,013	43.263	3.834
1943	5	1,019,771	—	—	3	45	48	—	—	4,950	1,123	6,073	47.069	5.955
1944	4	727,496	1	—	1	27	29	6,000	—	2,400	796	9,196	39.863	12.641
1945	7	1,238,845	—	—	2	22	24	—	—	3,000	755	3,755	19.373	3.031
1946	8	1,338,563	2	—	2	31	35	12,000	—	675	1,045	13,720	26.147	10.250
1947	8	1,291,162	5	—	1	29	35	30,000	—	75	1,588	31,663	27.107	24.523
Total	—	12,592,725	13	—	17	427	457	78,000	—	19,875	12,146	110,021	36.291	8.737

[1] See footnotes 1, 2, and 3, Table I.

TABLE V
YEARLY SUMMARY—QUARRIES AND UNDERGROUND MINES IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION, 1926-47 [1]

Year	Plants	Man-hours worked	Number of injuries [1]					Number of days of disability [1]					Frequency rate [1]	Severity rate [1]
			Fatal	P.T.	P.P.	Temp.	Total	Fatal	P.T.	P.P.	Temp.	Total		
1926	43	5,816,909	3	—	6	241	250	18,000	—	9,000	4,772	31,772	42.978	5.462
1927	50	8,195,240	10	—	3	472	485	60,000	—	2,400	7,254	69,654	59.181	8.499
1928	58	8,051,291	9	—	5	390	404	54,000	—	9,000	6,381	69,381	50.178	8.617
1929	57	8,635,845	5	—	6	316	327	30,000	—	6,060	6,150	42,210	37.865	4.888
1930	74	8,608,782	7	—	10	242	259	42,000	—	7,475	4,139	53,614	30.086	6.228
1931	61	5,430,962	4	—	13	202	219	24,000	—	18,660	3,687	46,347	40.324	8.534
1932	42	2,820,300	1	—	4	81	86	6,000	—	6,750	2,646	15,396	30.493	5.459
1933	43	2,934,252	1	—	1	78	80	6,000	—	48	3,242	9,290	27.264	3.166
1934	50	3,536,403	1	—	2	119	122	6,000	—	2,850	2,160	11,010	34.498	3.113
1935	48	4,342,300	2	1	8	80	91	12,000	6,000	9,900	3,264	31,164	20.957	7.177
1936	54	6,733,770	6	—	14	189	209	36,000	—	8,168	4,707	48,875	31.038	7.258
1937	50	6,563,681	7	—	9	139	155	42,000	—	5,875	4,552	52,427	23.615	7.987
1938	50	4,992,561	2	—	6	78	86	12,000	—	6,600	3,317	21,917	17.226	4.390
1939	48	4,612,125	2	—	3	58	63	12,000	—	5,400	2,135	19,535	13.660	4.236
1940	50	4,734,396	1	—	6	86	93	6,000	—	7,050	3,901	16,951	19.643	3.580
1941	51	6,369,155	3	—	6	113	122	18,000	—	10,050	2,435	30,485	19.155	4.786
1942	52	7,964,829	3	2	2	216	223	18,000	12,000	3,300	5,452	38,752	27.998	4.865
1943	39	5,770,085	4	—	8	179	191	24,300	—	12,096	4,985	41,081	33.102	7.120
1944	36	4,723,929	4	—	5	145	154	24,000	—	5,400	4,119	33,519	32.600	7.096
1945	53	7,325,882	—	—	3	157	160	—	—	3,750	4,260	8,010	21.840	1.093
1946	54	8,630,738	3	—	8	228	239	18,000	—	5,816	5,175	28,991	27.692	3.359
1947	50	8,262,952	10	—	6	226	242	60,000	—	6,975	6,578	73,553	29.287	8.902
Total	—	135,056,387	88	3	134	4,035	4,260	528,000	18,000	152,623	95,311	793,934	31.542	5.879

[1] See footnotes 1, 2, and 3, Table I.

rate of 6.008 per 1,000 man-hours for these injuries was moderately higher than the corresponding 22-year average rate for enrolled quarries. Although the frequency of occurrence of the injuries of 29.691 per million man-hours was better than the average for the past 22 years, the 1947 rate was less favorable than in 1946 and 1945.

In the underground mines enrolled in the 1947 Competition, there were 5 fatal, 1 permanent partial and 29 temporary total injuries. (See Table IV) Owing principally to the high number of 5 fatalities, the injury-severity rate for these underground mines was 24.523 days lost per 1,000 man-hours of work or about triple the corresponding average rate for the 22 years of the Competition and was higher by far than in any other year. Injury frequency for the enrolled underground mines was the highest since 1944 but the 1947 rate was appreciably lower than the 22-year average.

Accident-Free Plants

The following 4 plants—all open quarries—received honorable mention and were awarded parchment reproductions of the quarry scene on the bronze trophy plaque for operating throughout the year without a disabling injury:

Winchester trap-rock quarry, The General Crushed Stone Company, Winchester, Middlesex County, Massachusetts; 86,460 man-hours.

Auburn limestone quarry, The General Crushed Stone Company, Auburn, Cayuga County, New York; 64,576 man-hours.

Marquette limestone quarry, Marquette Cement Manufacturing Company, Cape Girardeau, Cape Girardeau County, Missouri; 63,622 man-hours.

No. 4 trap-rock quarry, Southwest Stone Company, Knippa, Uvalde County, Texas; 55,515 man-hours.

The Competition

The winning plant in the annual National Crushed Stone Association Safety Competition is awarded a bronze plaque on which is portrayed in bas-relief the quarry scene on the pedestal of the "Sentinels of Safety" trophy awarded in the National Safety Competition. The plaque is furnished by the Explosives Engineer magazine. Each plant in the contest that operated throughout the year without a lost-time injury is given an honorable mention award of a parchment certificate which is a reproduction of the bronze plaque. In addition, each employee of an accident-free plant is presented with a Certificate of Honor.

This annual Competition for the promotion of safety in the crushed stone industry is conducted under the same rules as the National Safety Competition and the same records are used in both contests. There are two additional qualifications for the crushed stone competition which are that the operation must have commercial production of crushed stone and that the company be a member of the Association. Of the 476 enrolled operations in the 1947 National Safety Competition, 50 were operated by companies that are members of the National Crushed Stone Association.

The following 16 States were represented in the 1947 contest:

States	No. of plants	States	No. of plants	States	No. of plants
California	1	Missouri	3	Tennessee	1
Connecticut	3	New Jersey	1	Texas	2
Illinois	3	New York	10	Virginia	4
Maryland	2	Ohio	3	West Virginia	3
Massachusetts	1	Oklahoma	1		
Michigan	2	Pennsylvania	10		

Forty-five plants enrolled in the 1947 Competition were also enrolled in 1946. Three of these plants had accident-free records in both years; 16 had better severity rates in 1947; and 26 had worse severity rates in 1947. The following is a comparison of these identical plants:

Year	Man-hours worked	Total number of injuries	Total number of days of disability	Frequency rate	Severity rate
1946	7,530,474	226	26,463	30.011	3.514
1947	7,899,806	225	73,215	28.482	9.268

Year	Number of injuries					Number of days of disability				
	F.	P.T.	P.P.	Temp	Total	F.	P.T.	P.P.	Temp.	Total
1946	3	.....	7	216	226	18,000	.....	3,41[illegible]	5,047	26,463
1947	10	.....	6	209	225	50,000	.....	6,97[illegible]	6,240	73,215

Causes of Accidents

Forty-three percent of the accidents at the 50 crushed stone plants resulted from handling material or objects, falls of persons, and falls and slides of rock or material, as shown in Table VI. Haulage, falling objects, and flying objects were the succeeding most frequent causes of disabling injuries. Haulage, falls and slides of rock or material and falls of persons accounted for 80 percent of the days of disability.

TABLE VI

NUMBER OF INJURIES, BY CAUSES, AT QUARRIES AND UNDERGROUND MINES IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION IN 1947

Cause	Fatal	Permanent		Tempo-rary	Total
		Total	Partial		
Falls and slides of rock or materials	3	—	—	24	27
Handling materials or objects	—	—	1	40	41
Hand tools	—	—	—	15	15
Explosives	—	—	—	4	4
Haulage	4	—	1	18	23
Falls of persons	2	—	—	34	36
Bumping against objects	—	—	—	8	8
Falling objects	—	—	—	21	21
Flying objects or particles	—	—	—	18	18
Electricity	—	—	—	1	1
Drilling	—	—	—	4	4
Machinery	—	—	3	9	12
Stepping on objects	—	—	—	6	6
Burns	1	—	—	8	9
Other causes	—	—	—	7	7
Total	10	—	5	217	232
Not stated	—	—	1	9	10
Grand total	10	—	6	226	242

TABLE VII

DAYS OF DISABILITY BY CAUSES OF INJURIES AT QUARRIES AND UNDERGROUND MINES IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION IN 1947

Cause	Fatal	Permanent		Tempo-rary	Total
		Total	Partial		
Falls and slides of rocks or materials	18,000	—	—	775	18,775
Handling materials or objects	—	—	75	1,139	1,214
Hand tools	—	—	—	297	297
Explosives	—	—	—	85	85
Haulage	24,000	—	2,400	404	26,804
Falls of persons	12,000	—	—	1,242	13,242
Bumping against objects	—	—	—	130	130
Falling objects	—	—	—	484	484
Flying objects or particles	—	—	—	150	150
Electricity	—	—	—	206	206
Drilling	—	—	—	88	88
Machinery	—	—	675	323	998
Stepping on objects	—	—	—	77	77
Burns	6,000	—	—	228	6,228
Other causes	—	—	—	151	151
Total	60,000	—	3,150	5,779	68,929
Not stated	—	—	3,825	799	4,624
Grand total	60,000	—	6,975	6,578	73,553

TABLE VIII

AVERAGE DAYS OF DISABILITY PER TEMPORARY INJURY AT PLANTS ENROLLED IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION

Year	Underground mines			Open quarries			Total		
	No. of temporary injuries	No. of days of disability	Average days of disability	No. of temporary injuries	No. of days of disability	Average days of disability	No. of temporary injuries	No. of days of disability	Average days of disability
1926	34	533	16	207	4,239	20	241	4,772	20
1927	14	68	5	458	7,186	16	472	7,254	15
1928	68	888	13	322	5,493	17	390	6,381	16
1929	30	617	21	286	5,533	19	316	6,150	19
1930	15	468	31	227	3,671	16	242	4,139	17
1931	4	147	37	198	3,540	18	202	3,687	18
1932	6	165	28	75	2,481	33	81	2,646	33
1933	11	349	32	67	2,893	43	78	3,242	42
1934	13	287	22	106	1,873	18	119	2,160	18
1935	3	249	83	77	3,015	39	80	3,264	41
1936	7	117	17	182	4,590	25	189	4,707	25
1937	3	91	30	136	4,461	33	139	4,552	33
1938	2	133	67	76	3,184	42	78	3,317	43
1939	7	457	65	51	1,678	33	58	2,135	37
1940	8	888	111	78	3,013	39	86	3,901	45
1941	15	169	11	98	2,266	23	113	2,435	22
1942	33	1,213	37	183	4,239	23	216	5,452	25
1943	45	1,123	25	134	3,862	29	179	4,985	28
1944	27	796	29	118	3,323	28	145	4,119	28
1945	22	755	34	135	3,505	26	157	4,260	27
1946	31	1,045	34	228	5,175	23	259	6,220	24
1947	29	1,588	55	197	4,990	25	226	6,578	29
Total	427	12,146	28	3,639	84,210	23	4,066	96,356	24

Summary of Tables

Tables I and II show the relative standing of the open quarries and underground mines, arranged in ascending order of accident-severity rates of the plants. When two or more plants have accident-free records, the number of man-hours governs the order. Tables III and IV show yearly summary figures from 1926 to 1947. Table V shows a yearly combined summary of open quarries and underground mines in the Competition. The number of injuries by causes and the days of disability by causes of injuries are shown in Tables VI and VII. Table VIII gives the average days of disability for temporary injuries at mines and quarries enrolled in the contest. Table IX gives employment and accident data for crushed stone plants enrolled in the National Crushed Stone Association Safety Competition, 1946 and 1947, covering identical plants for both years and plants enrolled only in 1946 and 1947.

TABLE IX
EMPLOYMENT AND ACCIDENT DATA FOR CRUSHED STONE PLANTS ENROLLED IN THE NATIONAL CRUSHED STONE ASSOCIATION SAFETY COMPETITION, 1946 AND 1947, COVERING IDENTICAL PLANTS FOR BOTH YEARS AND PLANTS ENROLLED ONLY IN 1946 OR IN 1947

	No.	Man-hours worked	Number of injuries [1]					Days of disability [1]					Frequency rate [1]	Severity rate [1]
			F.	P.T.	P.P.	Temp.	Total	F.	P.T.	P.P.	Temp.	Total		
Plants enrolled in 1946 only.....	9	1,100,264	—	—	1	12	13	—	—	2,400	128	2,528	11.815	2.298
Identical plants enrolled both years, 1946.....	45	7,530,474	3	—	7	216	226	18,000	—	3,416	5,047	26,463	30.011	3.514
Identical plants enrolled both years, 1947.....	45	7,899,806	10	—	6	209	225	60,000	—	6,975	6,240	73,215	28.482	9.268
Plants enrolled in 1947 only.....	5	363,146	—	—	—	17	17	—	—	—	338	338	46.813	0.931

[1] See footnotes 1, 2, and 3 in Table I.

Conference on Industrial Safety

PURSUANT to a call of President Truman, several hundred delegates representing industry, labor, safety organizations and governmental agencies, met in Washington in a President's Conference on Industrial Safety on September 27, 28, and 29, for the purpose of establishing scopes, objectives, committee organizations and procedure in a long-term cooperative plan of action to preserve the lives of the nation's industrial workers. These workers now number sixty-one million men and women, of whom, during 1947, two million were injured, seventeen thousand killed, and ninety-one thousand permanently disabled. The Bureau of Labor Standards of the U. S. Department of Labor is cooperating in this movement.

Technical committees were formed covering Analysis and Use of Accident Records, Laws and Regulations, Engineering, Research, Education, Labor-Management Cooperation, and Programs and Services.

Our industry was represented at this conference by Lea P. Warner, Jr., of Warner Company, Philadelphia, Pa., and H. F. Yotter, of The General Crushed Stone Company, Easton, Pa.

Beulah Marion Davies

MEMBERS of the National Crushed Stone Association will be deeply shocked and saddened to learn of the untimely passing on September 15, 1948, of Miss Beulah M. Davies, a member of the Association's headquarters staff since the establishment of its offices in Washington, D. C., in 1925. It was on October 23 of that year that Miss Davies left her former position with the Bureau of Public Roads to assume her duties with NCSA as secretary to Mr. Goldbeck. During the twenty-three years of her employment she served the Association faithfully and well through her unselfish devotion to the interests of NCSA. Miss Davies attended her first Annual Convention in Montreal, Canada, in 1926, and until illness prevented her going to the meeting in Cincinnati last January had been present at each successive convention. Through her kindly and helpful assistance at the convention registration desk, she made a host of friends throughout the industry. We miss her at headquarters and know that to the many who knew her well the conventions will seem not quite the same without her.

Miss Davies is survived by her sister, Mrs. A. T. Goldbeck, four other sisters and four brothers.

State-Federal Relations in Highway Development[1]

By THOS. H. MacDONALD
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Washington, D. C.

WHILE in theme repetitious of previous observations before this Conference, a review of State-Federal relations in our common objective of efficient highway development appears timely, since the lag is greater in perfecting administrative organization and practices than in development of engineering techniques. In the long run the results realized will depend in greater degree upon the quality of highway administration than upon the accumulated engineering knowledge. The latter is the servant, not the master, of highway destiny. Progress in engineering techniques goes on at an accelerated pace. This contrasts sharply with advance in administrative policies and the development of efficient administrative tools.

The engineer, before turning his transit forward, takes precise observations upon his previously fixed points. For the course to follow ahead, he is greatly aided if major triangulation monuments have been previously established. The postwar years particularly have been marked by uncertainties without triangulation points ahead. In place of reliable landmarks to guide the highway official in solving day-to-day problems of administration, there have been continuing blank spaces of major extent. Decisions have to be made resting upon the best information available at the moment, with the full knowledge that conditions as they unfold may substantially affect the validity of policies thus set in motion to accomplish hoped-for objectives.

Highway development for the nation is no overnight job. It is a continuing undertaking with mammoth dimensions, and its importance is rapidly accelerating. The only guidance the highway official has under present-day conditions to determine current administrative policies are the back sights that are fixed by yesterday's experience, and the collection and analysis of factual data to determine the future course that appears to offer greatest promise.

[1] Presented at the 34th Annual Meeting of the American Association of State Highway Officials, Salt Lake City, Utah, September 21, 1948

The most useful administrative test for building a sound policy structure is the factual focus. The bringing into focus of all major facts is the only method of obtaining a reasonably true perspective of large problems—an effective tool too infrequently used. Since improved highways must be classed as public services, not as end products, the factual focus should be used to measure their relativities. That is, their true priority and value are relative to the essentiality of each of the whole category of individual and public services which are dependent upon them and impossible without them.

Upon this basis we can examine some of the current policies and problems.

Relative Extent of Federal-aid Highway Program

Criticism has been expressed that the three-year annual $500,000,000 Federal-aid authorization of 1944 represented an extraordinary participation by the Federal Government in the Nation's total highway and street program, and that since the level of private industrial activity and employment is very high, the size of the Federal-aid program should be materially reduced in the interest of economy and as an anti-inflation measure. Testimony to this effect was in fact introduced during the hearings in Congress preceding the passage of the 1948 Act which authorizes $450,000,000 per year for the fiscal years 1950 and 1951.

The facts tell quite a different story. It is now universally recognized that adequate highway systems are required by, and are essential to, the economy and security of the Nation. The postwar Federal contribution is not a major or even a high percentage of the annual cost of providing and maintaining the highways and streets now in service. During the years 1946 and 1947 it represented only 14 percent of the total highway construction and maintenance bill. For these years the Federal contribution in actual expenditure did not reach the level of $500,000,000, but if the full rate of expenditure had been realized, the Federal contribution

would have been less than 20 percent of the total highway bill. There is no way to measure with any precision the relative Federal, State and local responsibilities in the cost of providing our highways and streets. There can be a reasonable recognition of the equities involved. In this cooperative undertaking, which possesses such extensive national utility, and which is best suited to our plan of government, it is inconceivable that a Federal contribution ranging between 15 and 20 percent of the over-all cost can be fairly judged an adequate contribution by the Federal Government, much less an excessive participation.

Viewed as a single isolated figure preceded by a dollar sign and followed by a string of ciphers, $500,000,000 is a large sum. Viewed in its proper context in relation to the total of Federal expenditures, and the dollars involved in the highway transportation industry as a major element in the whole national economy, the Federal contribution to the highway program of the Nation does not bulk so large. During the fiscal year 1948 Federal expenditures approximated $36.66 billion. Of this total, slightly more than 3 percent was expended on construction, and less than one percent on the Federal-aid highway program. Again, if the rate of expenditure of Federal aid had been at the full amount authorized, it would have represented less than 1½ percent of the total Federal expenditure. Does this now appear to be such an excessive contribution by the Federal Government?

In terms of the individual citizen, a $500,000,000 Federal participation represents $3.42 per capita, or less than one penny per day. This is equivalent to about one stick of chewing gum.

There is still another factor to be considered in viewing the size of the Federal-aid highway contribution. The postwar dollar is considerably smaller than the prewar dollar. Expressed in terms of highway construction purchased, the present annual postwar Federal-aid contribution amounts to very little more than the smaller Federal-aid authorizations of the prewar years, and is relatively less than work relief expenditures for certain years.

Incidentally, propaganda unchallenged seriously misleads public thinking. The criticism that Federal aid as a policy leads to extravagant spending is false. The rate of expenditure relative to the funds available is more rapid for projects financed wholly by State or Federal funds than for projects financed jointly. This slower rate of exhaustion of funds reflects more adequate consideration of priority of need, and more thorough preparation of plans required as a prerequisite for joint administrative agreement. These requirements many times are the only protection of a sound, long-range program against the distortions of political pressures or promises.

The Highway System—An Operating Plant

Next in order perhaps under present conditions is a backsight on the question,—Are highway improvements a luxury purchase? The provision, maintenance and operation of highway facilities represent basically an essential phase of one of the principal industries of the Nation—the industry of highway transportation—an industry which we obviously cannot eliminate and one which the public gives no indication of curtailing. Quite the contrary! In the postwar period the unexpected expansion of the highway transportation industry is continuing. It is reflected in no uncertain terms by the continued demand for new cars, by the amazing increase in motor truck use, and by the increase in the use of all motor vehicles.

With all its size and importance, expenditures for highway transportation are a modest portion of all expenditures of the Nation. The Department of Commerce reports that in 1947 the total of personal consumption expenditures was 165 billions of dollars, of which slightly more than 12 billions, or about 7.5 percent, went for motor vehicle transportation. In 1947 total highway and street expenditures approximated $2.5 billion, only 1.5 percent of $165 billion. If street and highway expenditures could be eliminated entirely, it would have no preventive effect as an anti-inflation measure.

The industry is as completely dependent upon highways and streets, upon which all motor vehicles must operate, as it is upon the motor vehicles themselves. The only difference from a completely private transportation industry is that in this case the roadbed, or the plant, is provided by Government—Federal, State and local. Just as with any other plant, this plant must be initially constructed, enlarged from time to time, maintained, and periodically renewed. Road sections wear out and must be replaced. Obsolescence is an acute factor. There may be some categories of public construction, generally lumped under the label "public works," which can be regarded as postponable in times of prosperity, and which can be undertaken or expanded ma-

terially in times of depression in accord with the "pump priming" theory. The provision of adequate highways and streets cannot be so classified. Maintenance to a degree can be substituted temporarily for construction and reconstruction. This is exactly what we did during the war period, and to no small extent what we are now doing in the postwar period. During the war we built up a large backlog of deferred construction and reconstruction which we have hardly begun to reduce. In every State the volume of required construction necessary to bring our highways and streets to a condition of adequacy represents a program which it will require years to complete. To attempt to defer this needed program of capital improvements by maintenance is simply a penny-wise, pound-foolish policy. The maintenance dollar is worth no more than the construction dollar. Beyond a certain point it becomes necessary to spend several maintenance dollars for every construction dollar to keep an outworn section of highway or street in service. With obsolete highways we soon reach the point where the expenditure of any number of maintenance dollars will not keep them open to traffic. The maintenance forces of the Nation have done an heroic job during the war and the immediate postwar period, but it is high time that we recognize the need to accelerate our program of capital replacements in the interest of true economy. We cannot achieve true economy by depreciating the capital now invested in our highways.

Price Trends and Progress

Highway construction costs continue at a high level and the price trend still points upward. However, the increase in highway costs is not out of line with the increase in costs for all types of construction, which in turn is not out of line with the general increase in the cost of all commodities. Since the total street and highway construction currently represents less than one-tenth of the total of construction activity, it is apparent that the highway and street program is too small a part of the total construction program, to say nothing of the total national economy, to affect the price structure materially.

If we are to continue in business we must pay the "going rate." If there is contractors' capacity to produce we need to increase our operations, in many States to a figure double or treble the present rate of construction. In doing so, however, we are not justified in paying exorbitant prices. We must continue our policy of eliminating unnecessary high-cost items, and of "careful shopping" for the essential items.

A study of price relationships in individual States indicates that we would pay about the same unit prices for highway work whether we halved the present highway program or doubled it. In 1947 the highway program in various States ranged from less than 5 percent to more than 15 percent of the total construction activity, and yet there was no consistent relationship with respect to the extent of the advance in highway prices.

This is not to say that in any State the highway program can be doubled overnight without any effect on highway prices. It is probable that the manner in which the program is accelerated and maintained has a much more significant effect upon prices than the size of the program within the limits which we are here discussing. Unless the State adopts a policy of smoothly accelerating its construction program to the required rate, and thereafter maintains that rate, the highway contracting industry will not be encouraged to meet the program, nor can highway contractors afford the risk of close bidding when contract lettings are offered on an erratic feast and famine schedule.

We all recognize that the highway construction program has been seriously handicapped since the end of the war by critical shortages of materials, equipment, contractors' organizations, and labor. Many of the shortages are still with us. The staffing of adequate engineering organizations continues to be difficult. High prices heretofore have caused the postponement of many needed improvements in the hope of a price decline. Necessary preliminary arrangements relating to planning and financing are holding up some of the very important urban projects.

During the three years since the end of the war—the same three years for which the postwar funds were apportioned—we have placed postwar projects under contract to the extent of about $865,000,000 in Federal funds, or about 60 percent of the apportionments for the three years combined. In terms of construction put in place, the progress in advancing the postwar program amounts to about 40 percent of the funds apportioned for the first three postwar fiscal years.

Notwithstanding the many difficulties, the postwar program is gaining momentum. During the fiscal year 1946,—the first postwar fiscal year,—Federal

funds for postwar projects placed under contract amounted to only about 20 percent of a $500,000,000 apportionment. For the fiscal year 1947 the corresponding figure was 58 percent, and for the fiscal year 1948 it was 79 percent. During July and August of this year the projects on which contracts were awarded totaled over $100,000,000 in Federal funds, and included a sizeable volume of urban work.

While we have achieved in the postwar period much in which we can take pride, we have not yet achieved a rate of highway construction which is consistent with the needs. Considering the Federal-aid program as an index, the volume of construction put in place during the last fiscal year represents 71 percent of one postwar year's Federal-aid apportionment of $500,000,000. In relation to needs there is every evidence that a Federal-aid authorization of $450,000,000 to $500,000,000 a year is conservative. Thus far, however, measured in terms of the final test of construction put in place, we have achieved a $346,000,000 rate of production during the last fiscal year.

Several of the States have succeeded in advancing their Federal-aid highway construction program to the point where it approximates the postwar rate of Federal fund authorizations. Other States are approaching that objective. There are a number of States, however, whose postwar programs have been considerably delayed for various reasons, and it is in these States that particular attention needs to be given to expediting the programs in every way possible. The need for additional highway improvements is too great everywhere to justify satisfaction with respect to the over-all rate at which vitally needed facilities are being provided. Only by increasing our present efforts and continuing the program without interruption can we expect to overcome the many deficiencies that now exist in our highway transport plant.

Continuity of operations must be maintained. In a stable program, where the work contracted for and the work done during a year are about equal, it is necessary to have an average of about 60 percent of an annual apportionment contracted for and remaining to be done in order to accomplish during the year a volume of work equal to an annual apportionment. In an expanding program such as we have had since the end of the war, and have now, the ratio is 70 percent or more, and when there is a significant volume of large urban projects which require several years to complete, the ratio may be even higher.

These statements should not be misinterpreted. There are two reliable governors of the rate of contracting that should be attempted. First, the capacity of the highway organization to administer and to provide adequate engineering control, and second, the capacity of the contracting industry to mature high class production on time. These two governors effectively operating can be relied upon to determine the rate of contracting which should not be exceeded.

New Patterns of Highway Administration Crystallized by '44 Act

During the three decades 1916 to 1948 we have achieved a degree of highway development that far exceeds that of any other nation. The Federal-Aid Highway Act of 1944 constitutes a basic revision of Federal-aid highway legislation,—a revision not of the time-tested administrative principles of that law, but rather a revision adjusted to the three-fold task before us. It is not a mold to force conformance to any preconceived or arbitrary notion, but rather a recognition of the well defined future needs. It recognizes the basic requirements of our main routes by continued substantial provision for the primary Federal-aid system. It recognizes the need for the improvement of secondary or farm-to-market roads, but it wisely provides for an orderly development by requiring the designation of a system of principal secondary and feeder roads. It recognizes the increasingly acute problem of urban congestion with the provision of substantial authorizations for expenditure in urban areas. Finally, it provides for the designation of the National System of Interstate Highways. In the light of our present knowledge the integrated pattern recognizes the most important required service and provides a national policy of road improvement not subject to informed attack.

Population Distribution Pattern

Certain basic factors profoundly influence the direction of sound administrative policies. The long continued change in the population balance from the rural to the urban areas, the growth of metropolitan concentrations, the shifts in urban population internally, and the fantastic expansion of daily travel mileage have rendered obsolete the conventional street plan for major traffic flows, and made necessary arterial systems for the mass movements.

There has been a steady and rapid increase in the urban population, and a relative decrease in the rural population since 1800. From 1900 to 1940 the urban population increased from 40 to 56.5 percent of the total. In the same period, however, the population of the central core of the metropolitan areas increased at a much slower rate than their satellite communities. There has been a large increase in the size of metropolitan areas. The process is well illustrated by the nation's capital. The city has spilled over its original boundaries well into Maryland and Virginia. The approximate radius of the metropolitan area is at present about ten miles. There is every indication that it will shortly increase to 20 miles, and a sound plan for the future must extend well beyond this distance. Small, self-contained communities complete with shopping centers and small industries are springing up everywhere in this metropolitan area. The growth of these smaller business communities is largely the result of the initiative of a great many individuals without serious conformity to any metropolitan plan. Because of the large number of independent governmental units involved, practically every large metropolitan center is today without a coordinated plan for the area as a whole. The most effective way—probably the only way—to realize a desirable area plan, is to select and construct promptly the skeleton framework of a long-term development pattern;—that is, the arterial road and street network which must serve the satellite communities and the central city. Until this framework, comparable to the steel framework of a modern building, becomes an actuality, the growth of the suburban communities, business districts and industries will continue to be largely an uncoordinated, heterogeneous growth. When the framework is an actuality, the growth of these communities will almost automatically be adjusted to the arterial system and be regulated thereby.

New Concepts of Decentralization

The growth of industrialism supplied the reason for population concentration. Industry has been piled on industry in metropolitan areas, and the constantly increasing numbers of workers required have multiplied the problems of preserving decent living standards. One major result is the priority problem of traffic congestion. There has been much conversation about decentralization, but very little has been done to change the trend of plant expansion in close proximity to existing units. Now a new concept—that of security—is for the first time being given serious attention. Recently the National Resources Security Board has stated that the only present known defense against the new and terrible weapons of warfare is space;—not that space in itself protects, but that by segregation at reasonable distances of plant units,—particularly those of a critical nature,—there is the opportunity to protect the major part of an industry. Heretofore decentralization of industry has been loosely thought of in terms of relatively long distances. With the newer concept of five- to ten-mile separations of plant units, and the separation of critical from non-critical plants or institutions, there appears to be a possibility of the acceptance of a new pattern for the future as new plants are built or old ones expanded. Over a period of time a measure of security would emerge that certainly does not now exist. The relation of such a concept of industrial development in the future to the larger scale planning of the arterial highway system within metropolitan areas is apparent. The policy of a security plan for future plant location and development is utterly dependent upon the provision of free flowing arterial and inter-communicating highways. Such highways must cut across the boundary lines of many jurisdictions. They become a common denominator for the whole area. By the force of these conditions the highway officials, State and Federal, are projected into the role of coordinators.

Pressures to Distort a Balanced Highway Program

This year motor vehicles in use will doubtless pass 40,000,000 units. The service demanded of the highways, and every quantitative element involved in highway transport stand at an all-time high. Highway construction costs are double those of the prewar period, and the highway funds are being depleted by maintenance costs at nearly twice the prewar rate. There are individuals and associations purporting to speak for the industries most dependent upon the extent, capacity and condition of the highway systems for their markets, that are placing serious obstructions—perhaps the main obstacles—in the path of the highway officials who are endeavoring to plan a legislative program calculated to meet at least in part the current realities of service demand, cost and income. Along with the demand of purely selfish interests for the legalizing of heavier loads, and the lowering of road user taxes, are the pressures to disperse road user income to the

less important roads and away from the control of the highway departments. The only possible way of meeting the critical situation thus induced is an informed public opinion secured through the medium of the current needs studies now under way in many States. The importance of these cannot be over-emphasized. The membership of the study committees is composed of, or includes, representatives of the legislature, thus meeting the essential requirement that the legislative branch shall have complete information and shall help to formulate recommendations.

Our faith in the tenets of democracy lies largely in the proven fact that we can rely upon the majority action when the legislative branch understands the problems. We have recent confirmation in the legislation adopted by the State of California after a thorough study and a factual report of the reasonable needs. That State has rendered a great service in pioneering a sound procedure to secure public support and legislative approval of a well balanced highway development program.

State-Federal Administrative Operations

The truly significant effect of the Federal-aid plan of operation is qualitative. The results spring less from the Federal funds than from the administrative principles incorporated in the Federal-aid legislation with the passage of the first Acts in 1916 and 1921, and which are perpetuated in the Act of 1944. In essence, these administrative principles establish a partnership of each of the State governments, represented by its State highway department, and the Federal Government, represented by the Public Roads Administration;—a partnership to which each partner brings his contribution and in which each assumes his share of responsibility; a partnership in which there are allotted to each partner specified functions; a partnership dedicated to a single, nation-wide program. Moreover, each of the separate State partners has a common Federal partner, which has been of the utmost importance in securing cooperation of adjoining States in the solution of inter-State problems.

The motive that first brought the State highway departments together to form this highly important American Association of State Highway Officials was the seeking of Federal highway legislation. The Federal-aid plan has demonstrated the principle that the States and the Federal Government can, by joint action, successfully attack problems which have both State and Federal aspects. There are no highways, except in Federal areas, that are constructed and maintained wholly by the Federal Government, like the "National Highways" of other countries. Although other factors are involved, the plan of joint highway administration adopted in this country is very largely responsible for the advance in engineering techniques, operations and production, that has made the United States the Mecca of the highway engineers and officials of the world.

When the Federal highway law of 1916 was enacted, a most important prerequisite to the sharing in the Federal funds by the individual States was the establishment of an adequate State highway department. Less than half of the States had such departments. Today, with every State included, these departments are an honor to, and a major constructive force for, the Nation.

The 1944 Act extended Federal aid to the secondary and urban road systems. Of the more than 3,000 counties, our estimates at that time showed less than one-third provided with adequate highway engineering administration. In the urban areas for the first time under the supervision of the State highway departments, wide-spread engineering studies were made of the modern requirement of efficient arterial systems. The progress is good within the time. When we succeed in these areas in establishing the same engineering service and control that now exist for the Federal-aid highway system, we are well on the way toward the realization of a balanced highway program for the Nation.

We have attacked together the many new frontiers involved in the enlarged program. The more extensive operations have required changes in the organization of the Public Roads Administration as well as the State highway departments. There have been surprisingly few frictions developed by these major changes, a fact for which we are profoundly grateful to the State highway departments. We realize that these Departments confront certain difficulties, and it will be the constant effort of the Public Roads Administration, in its administrative policies, to provide the flexibility that will make the task of the highway easier, and free them from unnecessary administrative detail to the fullest extent consistent with our legal responsibilities. Our objective is that of the State highway departments. It is to the interest of the Public Roads Administration that we have and help to develop the strongest possible highway department in every State.

Dealings Between Businessmen[1]

MOST businessmen have a solemn feeling of the obligation to maintain honor in the business world. They are men who recognize the importance of the square deal as part of creative industry.

The real test of a man's ethics comes in the twilight zone between what is clearly demanded by the tests of honesty, and what is required by that combination of feeling and judgment which is the mark of a good businessman.

Merely being legal will not bring customers back. Trade depends upon goodwill, in which legality is only an ingredient. For custom the businessman depends upon the judgment of buyers; for credit he depends upon the reputation for integrity he has with his banker; for his trade reputation he depends upon the appraisal of those in the same line of business—and there are no more merciless appraisers of men and their worth than business competitors.

The firm that establishes a reputation for honesty and for fair dealing beyond the necessities of the law has a business asset of great value and profit.

Dealings between businessmen themselves hang more and more upon good faith, and the reputation a man gets that his word is as good as his bond is an important asset. Sometimes one comes upon a man who relies upon the technical defense that he has not bound himself in writing: there is no contract or lease. That may avail in a court of law, but not before the bar of business ethics. There is a strong feeling for fairness in business today, and the man who does not conform finds himself avoided.

Some persons dismiss the question about professional ethics for business by just saying, "There's a difference." But do not the basic qualities of professionalism hold true for business? There is not yet the unity in business one sees in the professions, but each business is working steadily toward self-expression in the ethical field.

The high principles of square dealing apply even in competition, though it is a fact that the unscrupulous conduct of a few may make it difficult for many in the same line of business to live up to their ideals. Competition is a severe referee and looks only at results, not at motives. The rewards for success are great, and the penalty for failure is oblivion.

When competition is put on public trial, its accusers emphasize the bad forms it has sometimes taken, and do not bring out the fact that in most of its forms competition is essential to the maintenance of energy and enterprise, and without these we should cease to progress.

Competition is not good or bad in itself. There is ethical competition, toward which all men who have a high opinion of themselves and high hopes for society are working. Those who are unscrupulous are finding it more difficult to maintain their place in commerce.

Business does not wait for others to make its moralities. It not only polices itself to a large extent, but it is constantly trying to set higher standards. Never before was there such a keen feeling of the responsibility of corporations to stockholders, customers, employees and the public.

Business has set up organizations to help to extend and maintain its ethical standards. Nearly 40 years ago Better Business Bureaus were organized by businessmen who realized that bad business practices not only hurt business at once but threatened the health of business enterprise.

Trade associations, too, are raising ethical standards in business. These are organizations in which businessmen join together in the old guild spirit for collective action looking toward improvement of their business and of their relations with the public. These associations become professionally conscious, and set up standards of practice or codes of ethics based upon the motive of service.

It is a time to show the essential fairness of our way of life. Defects will reveal themselves from time to time . . . the nearer we attain to perfection in one respect, the more defects in others are thrown into prominence. But as society and the community advance, so will business hold itself increasingly accountable to the public, and responsive to the public trend.

Many self-appointed reformers who never engaged in business fail to see that changes are not wrought by words and slogans but by thoughts and acts. Very few "reformers" know or admit the steady ethical evolution that is going on within business. As one modern business writer has said, "The world quietly turns over while the professional reformers are barking at the moon."

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[1] A condensation by *The Advertiser's Digest* (September 1948). Reprinted with credit to the Royal Bank of Canada, *Canadian Purchasor*, and *The Advertiser's Digest*.

Apportionments Under New Federal-Aid Act Made to States for Fiscal Year 1950

AMOUNTS apportioned to the states under the 1948 Federal-Aid Highway Act were announced September 1, by the Public Roads Administration. The Act under which the apportionments are made provides a total of $450 million aid for each of the fiscal years 1950 and 1951. The apportionments for fiscal year 1950, which follow, become available next July 1 and remain available until June 30, 1952.

Total authorizations are divided by the Act into three groups—(1) 45% for projects on primary roads in the Federal-aid system; (2) 30% for Federal-aid secondary roads, and (3) 25% for Federal aid in urban areas having a population of 5000 or more. State percentages for each group vary in accordance with differing areas, population and post-road mileages.

These are the apportionments which the states must generally match:

State	Sums Apportioned for Fiscal Year 1950 for			
	Federal-aid Primary System	Secondary or Feeder Roads	Urban Highways	Total
Alabama	$4,234,466	$3,347,912	$1,157,921	$8,740,299
Arizona	2,883,981	1,994,406	232,926	5,111,313
Arkansas	3,437,818	2,765,905	495,958	6,699,681
California	8,025,813	4,595,138	7,216,292	19,837,243
Colorado	3,583,930	2,411,757	829,510	6,825,197
Connecticut	1,240,162	681,025	2,316,659	4,237,846
Delaware	974,531	649,688	181,297	1,805,516
Florida	2,894,455	1,938,785	1,421,220	6,254,460
Georgia	5,026,124	3,834,698	1,441,091	10,301,913
Idaho	2,478,367	1,733,203	188,176	4,399,746
Illinois	7,812,450	4,198,769	8,449,887	20,461,106
Indiana	4,762,317	3,193,419	2,723,787	10,679,523
Iowa	4,916,913	3,516,275	1,414,525	9,847,713
Kansas	4,973,808	3,493,343	983,721	9,450,872
Kentucky	3,765,200	3,045,891	1,154,581	7,965,672
Louisiana	3,036,036	2,270,096	1,360,748	6,666,880
Maine	1,721,234	1,240,539	498,017	3,459,790
Maryland	1,632,747	1,043,969	1,590,418	4,267,134
Massachusetts	2,614,477	698,824	5,875,054	9,188,355
Michigan	6,058,649	3,663,939	5,048,623	14,771,211
Minnesota	5,356,784	3,690,493	1,960,081	11,007,358
Mississippi	3,649,214	3,001,136	533,179	7,183,529
Missouri	5,909,105	4,048,164	2,799,683	12,756,952
Montana	4,048,884	2,766,121	273,348	7,088,353
Nebraska	3,954,543	2,791,999	695,466	7,442,008
Nevada	2,564,998	1,718,707	53,853	4,337,558
New Hampshire	974,531	649,688	422,019	2,046,238
New Jersey	2,547,207	927,053	4,911,404	8,385,664
New Mexico	3,234,379	2,238,846	228,567	5,701,792
New York	9,615,348	3,788,591	16,681,818	30,085,757
North Carolina	4,867,144	3,983,477	1,326,007	10,176,628
North Dakota	2,951,523	2,127,843	190,644	5,270,010
Ohio	6,967,252	4,101,078	6,698,622	17,766,952
Oklahoma	4,484,445	3,294,834	1,197,791	8,977,070
Oregon	3,330,486	2,272,391	720,430	6,323,307
Pennsylvania	8,156,836	4,679,791	9,344,128	22,180,755
Rhode Island	974,531	649,688	997,786	2,622,005
South Carolina	2,724,022	2,246,419	581,082	5,551,523
South Dakota	3,114,552	2,217,687	197,342	5,529,581
Tennessee	4,266,287	3,278,719	1,415,352	8,960,358
Texas	12,679,694	8,930,900	3,966,153	25,576,747
Utah	2,259,221	1,504,566	385,353	4,149,140
Vermont	974,531	649,688	188,251	1,812,470
Virginia	3,657,445	2,836,866	1,324,938	7,819,249
Washington	3,145,271	2,129,619	1,303,754	6,578,644
West Virginia	2,211,489	1,857,176	717,603	4,786,268
Wisconsin	4,802,731	3,253,279	2,358,393	10,414,403
Wyoming	2,474,161	1,679,067	118,209	4,271,437
Hawaii	974,531	649,688	349,535	1,973,754
District of Columbia	974,531	649,688	1,018,601	2,642,820
Puerto Rico	987,096	1,006,657	741,447	2,735,200

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Manganese and other Special Alloy Steel Castings

Thew Shovel Co.
Lorain, Ohio
Power Shovels, Cranes, Crawler Cranes, Locomotive Cranes, Draglines. Diesel Electric, Gasoline. 3/8 to 2-1/2 Cu. Yd. Capacities

Traylor Engineering & Mfg. Co.
Allentown, Pa.
Stone Crushing, Gravel, Lime and Cement Machinery

Trojan Powder Co.
17 N. 7th St., Allentown, Pa.
Explosives and Blasting Supplies

W. S. Tyler Co.
3615 Superior Ave., N.E., Cleveland 14, Ohio
Wire Screens, Screening Machinery, Scrubbers, Testing Sieves and Dryers

Unit Crane and Shovel Corp.
6411 W. Burnham St., Milwaukee 14, Wis.
Power Cranes and Shovels: Unit 514, ½ Yd. Crawler; Unit 1020, ¾ Yd. Crawler and Truck Mounted; Unit 357, ½ Yd. Self-Propelled Mobile Crane; Unit 1014, ½ Yd. Truck Mounted; Unit 1520, ¾ Yd. Self-Propelled Mobile; Every UNIT Model Completely Convertible to All Attachments

Universal Engineering Corp.
625 C Ave., N.W., Cedar Rapids, Iowa.
Jaw Crushers, Roll Crushers, Hammermills, Complete Crushing, Screening and Loading Plants, Either Stationary or Portable for Stone Aggregates or Aglime

Vibration Measurement Engineers
7705 Sheridan Rd., Chicago 26, Ill.
Specialists in Blasting Complaint Investigations; Seismological Surveying; Expert Testimony in Blasting Litigation